POPULATION ECOLOGY

A Unified Study of Animals and Plants

Population Ecology: A Unified Study of Animals and Plants Michael Begon, Martin Mortimer and David J. Thompson
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A Unified Study of Animals and Plants

MICHAEL BEGON BSc, PhD

MARTIN MORTIMER BSc, PhD

DAVID J. THOMPSON BA, DPhil

All of the Department of
Environmental and Evolutionary Biology
The University of Liverpool

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Preface

This book is intended primarily for students. It is designed to describe the present state of population ecology in terms which can be readily understood by undergraduates with little or no prior knowledge of the subject. We have, however, presented *our* view, rather than some definitive view of the subject, and consequently, we have tried to provide sufficient information for everybody (student and expert alike) to disagree with us wherever they think fit.

Population ecology is, to us, the study of the sizes (and to a lesser extent the distributions) of plant and animal populations, and of the processes, particularly the biological processes, which determine these sizes. As such, it must inevitably be a numerical and quantitative subject. Nevertheless, we have avoided complex mathematics, and we have, wherever possible, relegated the mathematical aspects of a topic to the final parts of the section in which that topic is examined. This will, we hope, make population ecology more generally accessible, and more palatable. But this is not to say that the mathematics have been played down. Rather, we have tried to play *up* the importance of real data from the real world: it is these, and not some mathematical abstraction, which must always be the major and ultimate concern of the population ecologist.

Developing the subject in this way, however, emphasizes that mathematical models *do* have an essential role to play. Time and again they crystallize our understanding of a topic, or actually tell us more about the real world than we can learn directly from the real world itself. Nature may be the ultimate concern of population ecology, but mathematical models, laboratory experiments and field experiments and observations can all help to further our understanding.

We have also tried to establish the point implied by the subtitle: that population ecology is a unified study of animals *and* plants. We are, of course, aware of the differences between the two. We feel, however, that plant and animal populations have had their own, independent ecologists for too long, and that, since the same fundamental principles apply to both, there is most to be gained at present from a concentration on similarities rather than differences.

In this third edition, we have retained the basic structure of the first two editions; but we have sought to evolve the text in areas where we feel particular progress has been made and consolidated. We have looked further at the role of spatial scale in the stability of host–parasitoid and competitive interactions and following from this, revisited the role of density-dependence in population regulation. We have addressed the problem of the detection of chaos, buried seeds, herbivory in plants, and introduced a major new section on the concept of the metapopulation. We have also tried further to cement some of the links between animal and plant populations by paying attention to descriptive equations common to both.

The book is set out in three parts. The first starts from the simplest first principles and examines the dynamics and interactions occurring within single-species populations. The second part, occupying approximately half of the book is concerned with interspecific interactions: interspecific competition and predation. 'Predation', however, is defined very broadly, and includes the plant–herbivore, host–parasite, host–parasitoid and prey–predator interactions. The third part of the book synthesizes and expands upon the topics from the preceding chapters, and does so at three levels: the regulation and determination of population size, the concept of the metapopulation, and the importance of intra- and inter-population interactions in determining community structure.

A number of people read all or most of the manuscript prior to publication of the first edition, and made generous and helpful suggestions, many of

which we have now incorporated. We are deeply grateful to Professor Tony Bradshaw, Professor J.L. Harper, Professor Michael Hassell, Dr Richard Law, Professor Geoffrey Sagar, Professor Bryan Shorrocks and, most especially, Professor John Lawton. We thank Professor Ilkka Hanski and Dr Chris Thomas for their comments on much of the new material presented in this third edition.

Population ecology has come a long way since its inception, and the rate of progress has never been faster than at present. Nevertheless, there are few, if any, populations for which we can claim to fully comprehend the underlying causes of abundance. Much remains to be understood, and a great deal more remains to be done.

Michael Begon
Martin Mortimer
David J. Thompson